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Description

[Exercise apparatus and method for tracking number of steps]

BACKGROUND OF INVENTION

[0001] Many people rely on programs of physical exercise to attain and to maintain health. Several such programs require that a person perform a daily minimum amount of exercise. For example, the 10,000-step program requires that a person perform a minimum of 10,000 steps of walking, running or the like each day for an average cumulative distance of over 5 miles.

[0002] In order to achieve this type of goal, many people wear a pedometer throughout their day to monitor the number of steps completed while walking about or running. The minimum number of steps may be completed on a piece of exercise machine such as a treadmill. A problem arises, however, in enabling accurate tracking of the cumulative total steps achieved both on and off of the exercise machine with minimal effort on the part of the person per-

forming the exercise.

[0003] Information potentially relevant to attempts to address these and related motivational problems can be found in U.S. Patent Nos. 6,705,972 to Takano et al.; 4,842,266 to Sweeney, Sr. et al.; U.S. Patent Application Publication Nos. 2004/0063547A1 to Wong et al.; 2001/0031031A1 to Ogawa et al.; Japanese Patent Publication Nos. 2001299732A to Ya Man Ltd.; 2000356529A to Narutomi Hanako; 11056819A to Hitachi Ltd.; and, 11076453 to Senoh Corp. However, each of these references suffers from one or more of the following disadvantages: (1) it requires that a user manually transfer data on number of steps achieved while off the exercise machine from a pedometer to an exercise machine; (2) it requires that an elaborate estimation of stride- or strike-length be made in order to convert time spent on the exercise machine to number of steps, leading to inaccurate equivalent step counts, failure to account for variations in a user"s stride length over time and limiting use of the equipment to one user of known stride-length; (3) it relies on elaborate mechanisms within the exercise machine to detect number of steps; and/or, (4) it relies on the pedometer, with its limited capacity for processing and storage of data, for

calculation and storage of cumulative step data limiting its longer term tracking and logging capabilities.

[0004] For the foregoing reasons there is a need for an exercise apparatus that enables accurate and automatic tracking of number of steps taken by a user on and off of an exercise machine.

SUMMARY OF INVENTION

[0005] The present invention is directed to an apparatus and method for employing same that satisfy the need for an exercise apparatus that enables accurate and automatic tracking of number of steps taken by a user on and off of an exercise machine. The apparatus is an exercise apparatus for use in accurately tracking number of steps taken by a user on and off of an exercise machine that solves the above-discussed problems.

[0006] In one version, the exercise apparatus comprises a step counter for continually counting a cumulative number of steps taken by a user throughout a period of time both while the user is on and off of an exercise machine, the step counter comprising a first communication means for periodically communicating a current value of the cumulative number of steps taken by the user to a console of the exercise machine while the user is on the exercise ma-

chine; and, the console that comprises a second communication means for periodically receiving the current cumulative number of steps from the step counter while the user uses the exercise machine. The console may further comprise a data processor for calculating a progress indication and a display.

[0007] In another version, the step counter comprises an accelerometer to determine step count.

[0008] In another version, communication between the first and second communication means is wireless.

[0009] In another version, communication between the first and second communication means is wired.

[0010] In another version, the console or the step counter further comprises a memory means for the storage of user-specific historical data.

[0011] In another version, the exercise apparatus further comprises a memory means and the console further comprises a third communication means for communicating user-specific data to the memory means.

[0012] In yet another version, a method for employing the exercise apparatus described above is disclosed.

[0013] Several objects and advantages of the present invention are:(a) to provide an exercise apparatus that enables a

user to easily and accurately track number of steps taken each day in order to facilitate accomplishment of a goal number of steps; (b) to provide an apparatus with communication means between components that eliminates the need for manual input of step count by a user to an exercise machine; (c) to provide an apparatus that improves accuracy of step count data by restricting sensing of steps taken to one device, a step counter such as a pedometer, which is employed while the user is exercising both on and off of an exercise machine, thus eliminating errors that result when data are combined across devices; (d) to improve the accuracy of step count by employing a step counter that uses an accelerometer to determine step count; and, (e) to further enable storing and analysis of historical data by user for the tracking of performance over time.

[0014] The reader is advised that this summary is not meant to be exhaustive. Further features, aspects, and advantages of the present invention will become better understood with reference to the following description, accompanying drawings and appended claims.

Brief Description of Drawings

[0015] For a better understanding of the present invention, refer-

ence may be made to the accompanying drawings in which: Fig. 1, shows a version of the exercise apparatus comprising a console and a step counter; Fig. 2, shows a version of the exercise apparatus in use with a treadmill and where communication between the console and step counter is wireless; Fig. 3, shows a version of the exercise apparatus in use with a treadmill and where communication between the console and step counter is wired; Fig. 4, shows a version of the display of the console; and, Fig. 5, shows a version of the exercise apparatus wherein the memory means is separate from the console and wherein communication between the console and the memory means is wireless.

DETAILED DESCRIPTION

[0016] Referring now specifically to the figures, in which identical or similar parts are designated by the same reference numerals throughout, a detailed description of the present invention is given. It should be understood that the following detailed description relates to the best presently known embodiment of the invention. However, the present invention can assume numerous other embodiments, as will become apparent to those skilled in the art, without departing from the appended claims. For exam-

ple, the synchronizable console and step counter of the present invention may be associated with exercise machines other than treadmills such as elliptical trainers, exercise bicycles, steppers, and the like.

[0017] It should also be understood that, while the methods disclosed herein may be described and shown with reference to particular steps taken in a particular order, these steps may be combined, sub-divided, or re-ordered to form an equivalent method without departing from the teachings of the present invention. Accordingly, unless specifically indicated herein, the order and grouping of the steps is not a limitation of the present invention.

[0018] Detailed Description Apparatus

[0019] Referring to Fig. 1, one version of the present invention is an exercise apparatus 100 comprising a step counter 200 and a console 300 of an exercise machine 400 (see Figs. 2 and 3). The apparatus 100 allows a user to accurately and easily complete a daily program of stepping (e.g., the popular 10,000 step program), by tracking number of steps taken while exercising both on and off of an exercise machine 400.

[0020] The step counter 200 is a device that monitors the number of steps a user performs throughout the user's day (or

other period of time) based on their body's movement. In one version, the step counter 200 is a pedometer worn by a user (typically on their hip, but may be worn on a shoe or elsewhere) to detect and to record the number of steps taken by the user as they walk or run throughout the day, whether those steps are taken on or off of the exercise machine 400. Other forms of step counters besides pedometers may also be employed by a user.

[0021] The step counter 200 is reset in order to reset the number of steps to zero (0) at the beginning of a time period during which cumulative number of steps taken are to be counted. The step counter 200 may be resettable by the user by means of a reset button, switch or the like. Alternatively, the step counter 200 may have an integrated time of day function and reset automatically at the beginning of each time period. Other options are also possible for resetting the step counter 200. For example, the time period may be set by an exercise program integrated into the step counter 200 or the console 300 similarly as described for the goal number (see below). Time periods may be any period of time in which the user wishes to track his or her exercise. For example, the time period may be a day; portion of a day; week; month or any other

time period.

[0022] The step counter 200 continually tracks a cumulative number of steps taken by the user since being reset (or, cumulative step count 312). Generally, the step counter 200 will include a display window 210 (see Fig. 1) where the cumulative step count 312 is indicated and viewable by the user.

[0023] In one version, the step counter 200 employs an accelerometer technology to determine step count. The accelerometer may be a single-axis accelerometer or a multi-axis accelerometer. For example, a dual-axis accelerometer may be employed. The accelerometer provides improved accuracy in the detection of motion, thereby improving the accuracy of step count sensing over step counters based on the more commonly employed pendulum mechanism. However, in other versions of the invention, step counters employing pendulum mechanisms or other technologies may also be used as the step counter 200.

[0024] The step counter 200 is in communication with the console 300 when the user is using the exercise machine 400. The step counter 200 comprises a first communication means for communicating the cumulative number of

steps taken by the user from the step counter 200 to the console 300. In one version, the step counter 200 has a "send" button, or the like, to enable the user to initiate communication between the step counter 200 and the console 300 when the user begins using the exercise machine 400. Cumulative step count data 312 is then periodically communicated by the step counter 200 to the console 300 throughout the user's workout on the exercise machine 400. In this way, step count 312 is accurately and continually detected by the step counter 200 alone without the need to employ flawed estimations of step count based on stride lengths and distances or other data provided by the exercise machine 400.

[0025] All step count data 312 is provided by the step counter 200 which continually detects steps taken, with none provided by the exercise machine 400. This eliminates the errors and inaccuracies that can result when step counts from different devices, such as pedometers and treadmills, using different step count sensor techniques, are combined.

[0026] The console 300 of the exercise machine 400 generally comprises (a) a second communication means for receiving the cumulative step count 312 from the step counter;

and, optionally also, (b) a data processor for performing various calculations; and (c) a display 310.

[0027] In one version, and as depicted in Figs. 2 and 3, the exercise machine 400 is a treadmill. A treadmill is an exercise machine where the user walks or runs on an endless belt suspended between two rollers. The belt may be propelled by the user's own power or may be powered by a motor which rotates one of the rollers to drive the endless belt. In another version, the exercise machine 400 may be an elliptical trainer, an exercise machine where the user is in a standing position with each foot on a separate pedal platform arm while moving the pedal platform arms in an elliptical path. Typically this is achieved when one end of the pedal platform arm moves in a circular path, while the other end of the pedal platform arm moves in a reciprocating path. However, the console 300 of the present invention may be adapted for use with other types of exercise machines 400 such as steppers, exercise bicycles or the like.

[0028] Communication between the first communication means of the step counter 200 and the second communication means of the console 300 may be wireless (see Figs. 1 and 2) or wired (see Fig. 3). This feature eliminates the

need for the user to manually input step count data 312 from steps taken off of the exercise machine 400 to the console 300.

[0029] In one version, radio frequency (RF) communication, or radio frequency data communication (RFDC), is employed to enable wireless communication of data between the step counter 200 and console 300. A frequency of 5.5 kHz may be employed in some versions to take advantage of communication technology already present in the consoles of some currently available exercise machines. However, other versions may employ other radio frequencies or other wireless communication technologies such as infra red (IR) communication.

[0030] When RF communication is employed, the first and second communication means may be a transmitter and receiver, respectively, or both transceivers to enable two-way communications. In the case of IR communication the first and second communication means may be IR transceivers. In any case, the console 300's transceiver (RF, IR, or other) may be positioned at the console 300 or elsewhere on the exercise machine 400, such as on a handlebar.

[0031] In another version, wired communication is employed (see Fig. 3). In this version the user uses a connector 318 to

connect the step counter 200 to the console 300 via their respective communication ports. In this version, the first and second communication means would comprise the connector 318 and communication ports located on the step counter 200 and console 300. It should be noted that the communication port of the console 300 may be positioned at the console 300 or, alternatively, elsewhere on the exercise machine 400 such as on a handlebar.

[0032] The console 300's second communication means periodically receives the cumulative step count data 312 from the step counter 200 as the user exercises on the equipment 400. Generally, a cumulative step count from the user's activities prior to using the exercise machine 400 will be communicated to the console 300 when the user begins exercising on the equipment. As the user exercises on the equipment 400, current cumulative step count data 312 will be periodically communicated to the console 300 from the step counter 200. The console display 310 may be updated with the current step count 312 from the step counter 200 every 10 steps or at some other frequency depending on the particular version of the apparatus 100 employed.

[0033] In one version, the console 300 further comprises a data

processor. The console 3000's data processor is a computing device programmed to perform various calculations automatically including those on the cumulative step count data 312. The data processor may further perform calculations based on historical data for a particular user by retrieving that data from a memory means 500 (see below).

[0034] The data processor may further calculate progress toward a goal number of steps (see Fig. 4). For example, in one version, progress toward a goal number of steps is calculated as a remainder number of steps 314 yet to be taken by the user to complete a goal number of steps. Alternatively, progress toward the goal number of steps may be calculated as a percent completion 316 by dividing the goal number of steps by the cumulative number of steps 312. A simple "count-up" display, displaying the cumulative number of steps take 312, may also be used to indicate progress.

[0035] The display 310 may display one or more of these progress indicators including cumulative step count 312, remainder number of steps 314, percentage of goal obtained 316, and/or any number of other alternative measures (see Fig. 4). When the progress indication indicates

that the goal number of steps have been completed, it may trigger a further indication of goal attainment such as a congratulatory message in graphics, sounds, or combination of the two as positive feedback to the user.

[0036] The goal number of steps may be 10,000 steps as used in one popular exercise program, or some other number depending on the user's particular program and may be constant or vary over time. For example, many health and fitness programs encourage a build up period during which the user gradually works up to some higher goal number of steps, starting with smaller goals initially.

[0037] The goal number of steps may be set by the user by inputting the goal number into the console 300 or the step counter 200, depending on the particular version. When input to the step counter 200, the goal number may be communicated to the console 300 by the same first communication means as is used to transmit step count 312. In another version, the user may manually input the goal number to the console 300.

[0038] Alternatively, the goal number may be set automatically by means of a software program, such as so-called "smart coaching" software, incorporated into either the console 300 or step counter 200. Such a program may provide for

a progressive and gradual improvement in fitness and health, or may provide for some other type of fitness program depending on the needs of the particular user.

[0039] The console 300 will generally comprise a clock indicating date and time of day to enable the tracking of historical data for a user.

[0040] As mentioned above, user data such as cumulative steps taken 312, steps remaining 314, other progress indications and other user data (e.g., goal number of steps) may be displayed on the display 310 (see Figs. 1 and 4). The display 310 will generally be the display screen of the console 300. The display 310 may also serve to display other data pertinent to the particular type of exercise machine 400 such as incline, distance, speed, or calories burned, for example, which are commonly displayed on treadmills.

[0041] The display 310 may further function to display the historical user data (see below in versions including a memory means 500 for storing historical user data). Data regarding step count 312 may be displayed as subdivided by steps taken on versus off of the exercise machine.

[0042] The exercise apparatus 100 of the present invention may further comprise a memory means 500 for storing user-

specific historical data, that is, data on cumulative step count 312 by date by time period or the like. Historical data on number of steps taken 312 may, for example, be stored in a log format by date to enable tracking of the user's performance over time. This historical data may be used to calculate cumulative totals by day, month or year, average daily totals or the like. The user's log and other data may be accessed by the user and displayed using the display 310 in table or other graphical formats (such as progress graphs and the like) to help motivate and encourage the user to stay with his or her program.

[0043] In one version, the console 300 further comprises the memory means 500. In this version, the memory means 500 may be a memory chip(s) or the like, with the data thus stored accessible by the data processor. The data processor may use the log and other historical user data stored by the memory means 500 to calculate the cumulative totals, average daily totals, and to make other calculations.

[0044] This version would be common where the exercise machine 400 is located in a home environment. The user would conveniently be able to store, retrieve and display his or her data using the console 300. For example, the

console 300 may have a "Log Summary" button or the like for use by the user when they want to view their historical log information. Likewise, it may have a "View Graph" button or the like for use by the user when they want to view graphical presentations of their historical data. The period displayed may be keyed to the number of presses of the "View Graph" button. For example, one press may show a graph of the last 7 days, the second press shows the last 30 days, and a third press shows the last year.

[0045] In the case of multiple users in a single household, a unique user identification (or, user ID) may be used and communicated to the console 300 from the user's step counter 200 when the exercise machine 400 is used. In this way, historical data are stored in the memory means 500 by user in addition to by date and time (or other time period). The user ID may be preset in the step counter 200 and/or it may be set (or modified) by the individual.

[0046] Alternatively, the memory means 500 may be located in the step counter 200. In this version, the step counter 200 may further comprise means for communicating user information to another device such as a personal computer, PDA or the like.

[0047] As a further alternative, the memory means 500 may be

located elsewhere as part of a device such as a computer [i.e., general purpose computer of any type including desktops, laptops, hand-held computers (such as personal data assistants (PDA)), mobile phones, or other technologies], or a Web site (where data are stored on a remote server).

[0048] In this version, the console 300 would further comprise a third communication means enabling communication of the user's data to the memory means 500 located elsewhere. The third communication means may be wireless or wired and communicate with the memory means 500 via a local area network (LAN), the Internet or other wide area network (WAN), by means of RF or IR communication (or other wireless communication technologies), or by means of a connector (or other form of wired communication). For example, referring to Fig. 5, the memory means 500 is depicted as part of a server in wireless communication with the console 300.

[0049] This version (i.e., where the memory means 500 is located elsewhere), may be typically employed when the exercise machine 400 is located in a health club or the like where many different users will use a given piece of equipment 400. A user ID stored in the step counter 200 may be

communicated to the console 300, along with the step count 312, at commencement of exercise on the equipment 400. Data from the user's exercise session may then be communicated from the console 300 to the memory means 500 and stored by user ID. The memory means 500 may be memory in a computer located at the health club or off-site. The computer may function as a server accessible via a LAN or the Internet (or other WAN). The user's data may be accessible by personal trainers or therapists in addition to the user in order to evaluate the user's performance and program. As with the home version described above, the user ID may be pre-set in the user's step counter 200 by the maker of the step counter, the health club, the user or otherwise.

[0050] Detailed Description Method of use

[0051] The method for using the above-described exercise apparatus generally comprises: providing the exercise apparatus; at commencement of using an exercise machine, initiating communication between the apparatus" step-counting means and console; and, exercising.

[0052] Typically a user puts the step-counting means 200 (e.g., a pedometer) on his or her hip and resets the device prior to beginning their day. As mentioned above, an automatic

reset may alternatively be employed. Any step activity taken during the day (or other time period) will be counted by the step counter 200 and the user need not pay attention to the device as they proceed with their normal activities.

[0053] If at the end of the day, the user has not yet taken the goal number of steps (e.g., 10,000 steps), they may complete the remainder number of steps on an exercise machine 400 such as a treadmill, elliptical trainer or the like. The user simply initiates communication between the step counter 200 and the console 300 of the exercise machine 400 by pushing a "send" button or other similar switching device. In the case of the wired communication version, the user may plug a connector 318 into the first communication means of the step counter 200 and second communication means of the console 300 to initiate communication.

[0054] The step counter 200 is then in communication with the console 300 and communicates the cumulative step count 312 to the console 300. For example, if the user has completed 6,000 steps, that step count 312 will be communicated to the console 300 at commencement of using the exercise machine 400.

[0055] As the user proceeds to exercise using the equipment 400 (i.e., the user is on the exercise machine 400), the step counter 200 will continue to track cumulative step count 312 and periodically communicate that number to the console 300. The console 300 will periodically update the display (e.g., every 10 steps or so) so that it indicates one or more progress indicators such as the current cumulative step count 312, the remainder number of steps to be completed 314 and/or other indications of progress (e.g. percent completed 316, etc.) (see Fig. 4).

[0056] Once the progress indication shows that the goal has been attained (e.g., 100% complete), the user may choose to cease exercise. Otherwise, the user may continue until his or her goal is achieved.

[0057] Though the above may be a typical sequence of use, exercise may occur in other orders depending on the user and their particular situation that day. For example, the user may commence exercise on a particular day using the exercise machine 400, then complete his or her goal number of steps off the equipment 400. In this case, the user simply monitors his or her progress by periodically checking the step counter display 210. Alternatively, the machine may be used intermittently throughout the day.

[0058] In the event that the exercise program is completed off the machine 400, the user may still initiate communication between the step counter 200 and console 300 at the end of the day, so that the daily progress may be recorded in the memory means 500 of the console 300 just as it would be if the machine 400 were used to complete a day's program.

[0059] Historical data in log form as well as calculations of cumulative totals by day, month or year, average daily totals or the like, is available to the user. The user's information may be accessed by the user (e.g., by pressing a "Log Summary" button or the like) and displayed using the display 310 in table or other graphical formats (such as progress graphs, etc., by pressing a "View Graph" button or the like) to help motivate and encourage the user to stay with his or her program.

[0060] In versions of the invention used at health clubs or elsewhere by many users, the memory means 500 may be located away from the exercise machine 400 and thus the user accesses his or her information differently than with the home version described above (see Fig. 5). A user might access the data at a computer terminal at the health club, at the user's home or elsewhere by logging into the

club's computer or a Web site over a LAN or the Internet, by the user's unique ID. The user's ID, in this version, is stored in the user's step counter 200 and communicated to the console 300 along with step count data 312. The user's data is then stored by user ID in the memory means 500.

[0061] Similarly for the home version where there are multiple users, user ID's may be communicated to the console 300 and the user's data stored in the memory means 500 by user ID.

[0062] Advantages

[0063] The previously described versions of the present invention have many advantages, including: (a) to provide an exercise apparatus that enables a user to easily and accurately track number of steps taken each day in order to facilitate accomplishment of a goal number of steps; (b) to provide an apparatus with communication means between components that eliminate the need for manual input of step count by a user to an exercise machine; (c) to provide an apparatus that improves accuracy of step count data by restricting sensing of steps taken to one device, a step counter such as a pedometer, which is employed while the user is exercising both on and off of an exercise machine,

thus eliminating errors that result when data are combined across devices; (d) to improve the accuracy of step count by employing a step counter that uses an accelerometer to determine step count; and, (e) to further enable storing and analysis of historical data by user for the tracking of performance over time.

[0064] The present invention does not require that all the advantageous features and all the advantages need to be incorporated into every embodiment thereof.

[0065] Closing

[0066] Although the present invention has been described in considerable detail with reference to certain preferred versions thereof, other versions are possible. For example, the apparatus and method of the present invention may be used with exercise machine other than treadmills such as elliptical trainers, steppers, bicycles and the like. Therefore, the spirit and scope of the appended claims should not be limited to the description of the preferred versions contained herein.